

ABSTRACT

A manufacturing method for a single crystal of calcium fluoride by which it is possible to obtain a single crystal of calcium fluoride with adequately small double refraction, which can be used in optical systems for photolithography, and in particular, a single crystal of calcium fluoride with a large diameter (ϕ 200 mm or larger) having superior optical properties, which can be used for photolithography with a wavelength of 250 nm or less. A manufacturing method for a single crystal of calcium fluoride, having its optical properties improved through an annealing process in which a single crystal of calcium fluoride is contained in a sealable container, and said container is sealed and vacuumed, followed by, a process of heating with a heater arranged external to said container so that the temperature inside said container is raised to a first temperature, which is lower than the melting point of said single crystal of calcium fluoride, a process by which the temperature inside said container is maintained at said first temperature for a designated period of time, and a process by which the temperature inside said container is lowered to room temperature, wherein, the maximum temperature of the annealing process is set to be a first temperature within the range of 1020 to 1150 °C. Also provided is a manufacturing method for a single crystal of calcium fluoride having its optical properties improved through an annealing process such that, its maximum temperature during the thermal process is set to a first temperature which is within the range of 1020 to 1150 °C, and which is maintained for a designated period of time, and its cooling speed for reaching a second temperature, which is in the range of (or around) 600 to 800 °C, from said first temperature is set to be 1.2 °C/hour or less, or its cooling speed for reaching a second temperature, which is in the range of (or around) 700 to 900 °C, from said first temperature is set to be 1.2 °C/hour or less.